



AEGIS LABS INC.

Test Report

Pertaining To:

| Equipment Under Test | Model Number | Serial Number |
|--|--------------|----------------------|
| Intel PRO/Wireless 3945ABG Network Connection | WM3945ABG | 00B11A295CVD26965002 |

MEASUREMENTS PERFORMED IN ACCORDANCE WITH

International Regulatory Standard(s)

FCC CFR 47, PART 15 SUBPART B CLASS B



Certificate Number: 1111.01

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Test Report #: INTEL-051106F

Test Report Revision: N/A

| | REPORT BODY | APPENDICES | | | | TOTAL PAGES |
|-------|----------------|------------|---|---|---|----------------|
| | | A | B | C | D | |
| PAGES | 27 | 6 | 5 | 3 | 4 | 45 |

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1.0 CERTIFICATION OF TEST DATA

Aegis Labs, Inc. operates as both a Nevada and California Corporation with no organizational or financial relationship with any company, institution, or private individual.

Testing and engineering functions provided by Aegis Labs are furnished by RF technicians and engineers with accredited qualifications and training credentials to carry out their duties. The object of this report is to present test results which shall prove that the conducted and radiated emission levels of the EUT are within the acceptable limits as specified under Section 2.0 pertaining to indexed items 1-5 of this report.

The data, data evaluation and equipment configuration represented herein are a true and accurate representation of the Equipment Under Test (EUT) under the requirements specified in the global emissions standard as described below. However, the format and contents contained within this report do not reflect all the information required for agency submittals when certification for equipment authorization is mandatory. The entity and/or person(s) for which this report has been prepared acknowledge that such a report in its entirety has been recognized for verification purposes only. The test results contained in this report are only representative of the test sample tested as described in Section 6.0 of this report

The following countries shall accept this report as evidence that an accredited commercial EMC laboratory has properly tested the EUT and that the information contained herein can be used for application to the appropriate agency for which certification or approval is required. This information may be used by the manufacturer to make a self-declaration that this equipment can be marketed to the countries that recognize national laws that meet the conditions of a (1) Mutual Recognition Agreements, (2) EMC Directive or (3) equivalent bi-lateral agreement. The test results provided within this report, indicate that the information technology equipment has been found to be in **COMPLIANCE** with the test specifications based upon the following global RF compliance standards:

Pass/Fail determination is based upon the nominal values of the test data.

| EMISSIONS STANDARD | CLASS | TEST RESULTS |
|-------------------------------|-------|--------------|
| FCC CFR 47, Part 15 Subpart B | B | PASSED |

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2.0 SUMMARY OF REGULATORY LIMITS

| Index | Regulatory Standard | ¹ Class A Equipment Test Limits | | Results |
|-------|---|---|----------------------------------|---------|
| 1 | CONDUCTED EMISSIONS: Federal Communications Commission PART 15 INDUSTRY CANADA, ICES-003 | 0.15 MHz - 0.499 MHz | 66.0 dBuV (QP), 56.0 dBuV (AVG) | PASSED |
| | | 0.50 MHz – 4.999 MHz | 56.0 dBuV (QP), 46.0 dBuV (AVG) | |
| | | 5.00 MHz – 30.00 MHz | 60.0 dBuV (QP), 50.0 dBuV (AVG) | |
| 2 | RADIATED EMISSIONS: Federal Communications Commission PART 15 INDUSTRY CANADA, ICES-003 | ² 30.0 MHz - 230.0 MHz 230.0 MHz - 1000.0 MHz | 30.0 dBuV (QP) 37.0 dBuV (QP) | PASSED |

¹ Equipment that complies with these limits is subject to use in only commercial environments.

² The Rx Antenna and EUT were spaced 10m apart on the Open Area Test Site.

³ The Rx Antenna and EUT were spaced 3m apart on the Open Area Test Site.



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3.0 DEFINITIONS

digital device: An unintentional radiator (device or system) that uses digital techniques and generates and uses timing signals or pulses at a rate in excess of 9000 pulses (cycles) per second; inclusive of telephone equipment that uses digital techniques or any device or system that generates and uses RF energy for the purpose of performing data processing functions, such as electronic computations, operations, transformations, recording, filing, sorting, storage, retrieval, or transfer (FCC 47CFR Part 15).

electromagnetic disturbance: Any electromagnetic phenomena that may degrade the performance of a device, piece of equipment, or system, or adversely affect living or inert matter.

equipment under test: A device or system being evaluated for compliance that is representative of a product to be marketed.

host: A device to which other devices (peripherals) are connected and that generally controls those devices.

incidental radiator: A device that produces RF energy during the course of its operation, although the device is not intentionally designed to generate or emit RF energy. Examples of incidental radiators are dc motors, mechanical light switches and so on.

normalized site attenuation: Site attenuation divided by the antenna factors of the radiating and receiving antennas (all in linear units)

reference ground plane: A conducting flat surface or plate that is used as a common reference point for circuit returns and electric or signal potentials and that reflects electromagnetic waves.

tabletop device: A device designed to be placed and normally operated on the raised surface of a table, e.g., most personal computers.

unintentional radiator: A device that generates RF energy for use within the device, or that sends RF signals by conduction to associated equipment via connecting wiring, but which is not intended to emit RF energy by radiation or induction. (FCC 47CFR Part 15).

circuit power factor: the circuit power factor is the ratio of the measured active input power to the product of the supply voltage (r.m.s.) and the supply current (r.m.s.)

active power: the mean value, taken over one period, of the instantaneous power. Note: the active input power is the active power measured at the input supply terminals of the equipment under test.

total harmonic current: the total r.m.s. value of the harmonic current components of orders 2 to 40.

partial odd harmonic current: the total r.m.s. value of the odd harmonic current components of orders 21 to 39.

voltage fluctuation: series of changes of r.m.s. voltage evaluated as a single value for each successive half-period between zero crossing of the source voltage.

flicker: impression of unsteadiness of visual sensation induced by a light stimulus whose luminance or spectral distribution fluctuates with time.

r.m.s. voltage shape: the time function of the r.m.s. voltage, evaluated as a single value for each successive half period between zero-crossings or the source voltage



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4.0 APPROVAL SIGNATURES

Report Prepared By:

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Test Technician
Aegis Labs, Inc

11/29/05

Date:

Report Reviewed By:

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11/29/05

Date:

Report Approved By:

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11/29/05

Date:



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5.0 ADMINISTRATIVE DATA AND TEST DESCRIPTION

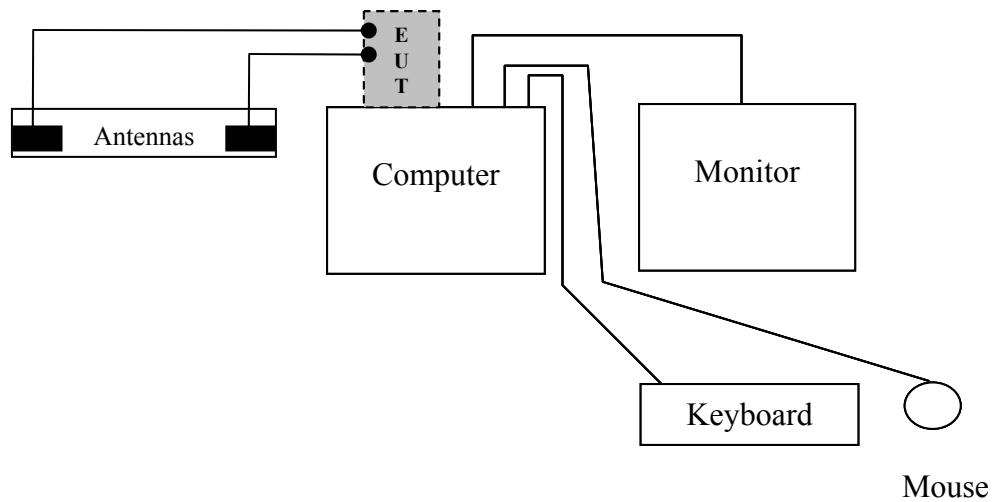
| | |
|----------------------------------|---|
| DEVICE TESTED: | ITE Type: Intel PRO/Wireless 3945ABG Network Connection Model Number(s): WM3945ABG Serial Number: 00B11A295CVD26965002 |
| | |
| DATE EUT RECEIVED: | October 31, 2005 |
| TEST DATE(S): | November 4-30, 2005 |
| | |
| ORIGIN OF TEST SAMPLE(S): | Production Sample |
| | |
| EQUIPMENT CLASS: | EUT tested as CLASS B device. |
| | |
| RESPONSIBLE PARTY: | Hewlett-Packard Company 20555 SH 249 Mail Stop 060607 Houston, TX 77070-2698 |
| | |
| CLIENT CONTACT: | Mr. Walter Overcash |
| MANUFACTURER: | Hewlett-Packard Company |
| | |
| TEST LOCATION: | Aegis Labs, Inc. 32231 Trabuco Creek Road Trabuco Canyon, CA 92678 Conducted Site #2 Radiated Site #2 |
| | |
| A2LA CERTIFICATE: | A2LA Certificate Number: 1111.01, Valid through February 28, 2006 |
| | |
| PURPOSE OF TEST: | To demonstrate compliance with the standards as described in Sections 1.0 & 2.0 of this report. |
| | |
| UNCERTAINTY BUDGET: | Proficiency Testing and Uncertainty Calculations for all tests indicated in this report have been conducted in accordance with ISO 17025:1999 requirements Section 5.5.4, 5.5.1 and 5.9. Uncertainty Budgets and Proficiency Test results available upon request. |
| | |
| STATEMENT OF CALIBRATION: | All accredited equipment calibrations were performed by Liberty Labs, Inc. and World Cal. with typical calibration uncertainty estimates derived from ISO Guide to the determination of uncertainties with a Coverage Factor of k=2 for 95% level of confidence. |



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6.0 DESCRIPTION OF EUT CONFIGURATION

6.1 Arrangement and Location of EUT and Host Equipment





6.2 EUT Description and Configuration

Equipment Under Test (EUT): Intel PRO/Wireless 3945ABG Network Connection

| | |
|--|--|
| Test Software & Firmware: | Intel Corporation Software (GRTT Ver. 1.1.1) |
| Number of External Test Ports Exercised | 2 Antenna Ports |
| Power Supply Voltage applied to EUT during qualification measurements | Conducted: 120VAC Radiated: 120VAC |
| AC Line Filter: Type, Make, Model Number(s), & Manufacturer: | None Identified |
| Crystal Oscillator(s): Location & Frequency: | N/A |

6.2.1 Product Description

The Intel PRO/Wireless 3945ABG Network Connection is an embedded 802.11a/b/g network adapter operating in the 2.4 GHz and 5 GHz spectrums. The EUT is based on the Mini Card form factor designed to meet the space and size requirements for thin and light notebook PCs. It is capable of a data rate of up to 52 Mbps.



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6.2.2 EUT Configuration

The EUT was set-up according to the ANSI C63.4: 2003 guidelines for emissions testing. For emissions testing the EUT (Intel PRO/Wireless 3945ABG Network Connection, Model Number(s): WM3945ABG) had antennas connected to its antenna ports.

The EUT was tested installed in the Mini PCI-E slot of the host computer as a modular device using a PCI extender board to extend the EUT outside the computer chassis. The EUT was then connected to a set of antennas via its Main and AUX antenna ports. Data for a set of HP Altima Antennas can be found in Appendix A (Data Sheets)

The low, middle, and high channels were tested in 802.11a, b, & g modes. Also, the EUT was tested once transmitting from the MAIN antenna port and once transmitting from the AUX antenna port. The EUT was placed in either continuous transmit or continuous receive mode by a program provided by the manufacturer (GRTT *Version 1.1.1*).



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6.3 List of EUT, Sub-Assemblies, and Host Equipment

| Equipment Under Test | | | |
|----------------------|--|--------------|--------------------------|
| Manufacturer | Description | Model Number | Serial Number |
| Intel Corporation | Intel PRO/Wireless 3945ABG Network Connection | WM3945ABG | 00B11A295CVD 26965002 |

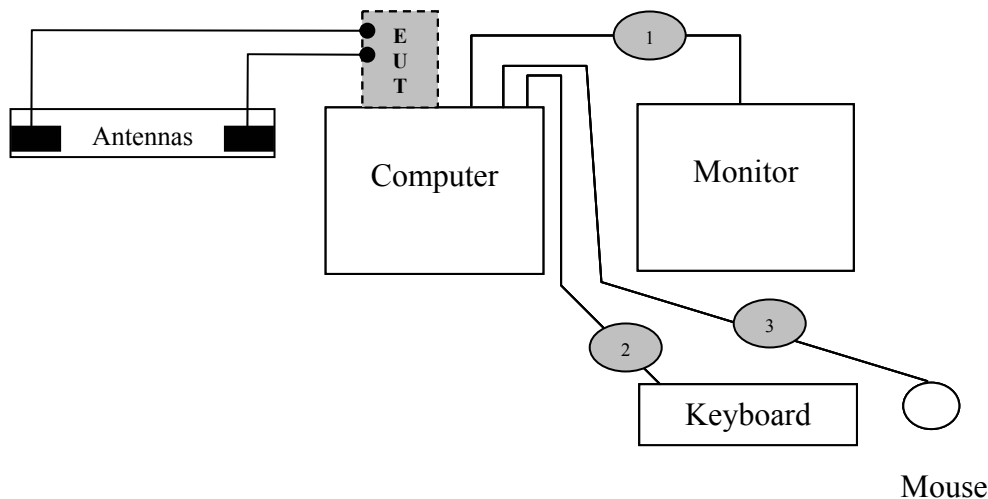
| EUT Sub-Assemblies | | | |
|---------------------------------|---------------------|--------------|---------------|
| Manufacturer | Description | Model Number | Serial Number |
| Main Multi Band Antenna | Wistron NeWeb Corp. | EBC-C4 | N/A |
| Auxiliary Multi Band Antenna | Wistron NeWeb Corp. | EBC-C4 | N/A |

| Host Equipment List | | | |
|---------------------|-------------|--------------|----------------|
| Manufacturer | Description | Model Number | Serial Number |
| Intel | Computer | Generic | IZTGUVV4312035 |
| Compaq | Monitor | 610 | 712BC060B526 |
| Logitech | Keyboard | Y-BF37 | MCTZ5200581 |
| Logitech | Mouse | M-BJ58 | PMA32715049 |



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6.4 I/O Cabling Diagram and Description



- Cable 1: This is a 6-foot braid and foil shielded round cable connecting the host computer with the monitor. It has metallic DB-15 type connector at the computer end and is hardwired to the monitor. The cable is bundled to a length of one meter and the shield of the cable is grounded to the chassis of both devices via the connector shells.
- Cable 2: This is a 6-foot braid and foil shielded round cable connecting the host computer to the keyboard. It has a metallic 6-pin mini din type connector at the computer end and is hardwired to the keyboard. The shield of the cable is grounded to the chassis of the computer via the connector shell.
- Cable 3: This is a 6-foot braid and foil shielded round cable connecting the host computer to the mouse. It has a metallic 6-pin mini din type connector at the computer end and is hardwired to the mouse. The shield of the cable is grounded to the chassis of the computer via the connector shell.



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6.5 List of Accessory / Host Equipment – Power Cables

MAXIMUM *POWER CABLE* CONFIGURATION OF EUT AND ACCESSORY / HOST EQUIPMENT

| Power Cable FROM Equipment to “PO or PS” | CABLE DESCRIPTION | LENGT H (m) | SHIELDED? FERRITE? LOCATION? |
|--|--|-------------------|------------------------------------|
| <i>PO/PS: Abbreviation for Power Outlet or Power Strip (PO/PS)</i> | | | |
| EUT | N/A | N/A | N/A |
| Host Computer | Generic, bundled to 1 meter for conducted testing only | 1.5 | N/A |
| Monitor | Generic | 1.5 | N/A |
| Keyboard | N/A | N/A | N/A |
| Mouse | N/A | N/A | N/A |



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6.6 EMC Test Software and Hardware Measurement Equipment

| TEST SOFTWARE AND LAB EQUIPMENT LIST | | | | | |
|--|--------------------|------------------|---------------|----------------------|-------------------|
| Equipment Name | Manufacturer | Model Number | Serial Number | Calibration Due Date | Calibration Cycle |
| Spectrum Analyzer | Agilent | 8565EC | 3946A00245 | 07/29/06 | 1 Year |
| Preamp | Aegis Preamplifier | Aegis-Oats1-1-18 | 001 | 07/27/06 | 1 Year |
| 2.4 GHz Notch Filter | Micro-Tronics | BRM50702-02 | 003 | 04/21/06 | 1 Year |
| 5.15-5.35 GHz Notch Filter | Microwave Circuits | N0452502 | 3173-01 | 06/27/06 | 1 Year |
| 5.725-5.850 GHz Notch Filter | Microwave Circuits | N0257881 | 3173-01 | 06/27/06 | 1 Year |
| Horn Antenna | ETS | DRG 3117 | 29614 | 07/23/06 | 1 Year |
| Antenna - 18-26.5 GHz Pre-amplified Horn | Aegis Labs, Inc. | H042 | SLK-35-3W | 11/04/06 | 1 Year |
| Antenna - 26.5-40 GHz Pre-amplified Horn | Aegis Labs, Inc. | H028 | GM1260-10 | 11/04/06 | 1 Year |
| Cable | Semflex | 60637 | S1L29BFS1348 | 04/11/06 | 1 Year |
| Temperature/Humidity Monitor | Dickson | TH550 | 7255185 | N/A | N/A |
| Power Meter | Anritsu | ML2487A | 6K00001785 | 04/12/06 | 1 Year |
| Wide Bandwidth Sensor | Anritsu | MA2491A | 31193 | 04/12/06 | 1 Year |
| 12dB Attenuator | Narda | 4779-12 | 203 | 08/06/06 | 1 Year |
| Antenna - Biconical | EMCO | 3110 | 9108-1421 | 05/17/06 | 1 Year |
| Antenna - Log Periodic | EMCO | 3148 | 4947 | 05/11/06 | 1 Year |
| LISN (EUT) | FCC | FCC-LISN-50-25-2 | 9931 | 02/06/06 | 1 Year |
| LISN (Access) | Com-Power | LI-200 | 12019 | 07/05/07 | 1 Year |
| LISN (Access) | Com-Power | LI-200 | 12018 | 07/05/07 | 1 Year |

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6.7 Operating Modes

6.7.1 Conducted and Radiated Emissions

The EUT was configured in a mode consistent with its operation by the end-user. The EUT (Intel PRO/Wireless 3945ABG Network Connection, Model Number(s): WM3945ABG) was exercised continuously by a test program provided by Intel Corporation, which exercised all the appropriate ports. The EUT operated continuously during all facets of testing.

All final peak, quasi-peak or average measurements and or levels were recorded using the following software and peripherals as follows:

| I/O PORT (S) / ACCESSORY EQUIPMENT EXERCISED DURING TESTING | | |
|---|----------------------------|---------------------|
| Peripherals or Components | Intel Corporation Software | |
| | ³ Passive | ⁴ Active |
| EUT | | √ |
| Host Computer | | √ |
| Monitor | | √ |
| Keyboard | √ | |
| Mouse | √ | |

³ For the purposes of this report, ACTIVE refers to any device or component that will receive, transmit or pass through data without the need for the user to manually activate the device.

⁴ For the purpose of this report, PASSIVE refers to any device tested that is idle of any data transmission and functions primarily as “dummy” termination.



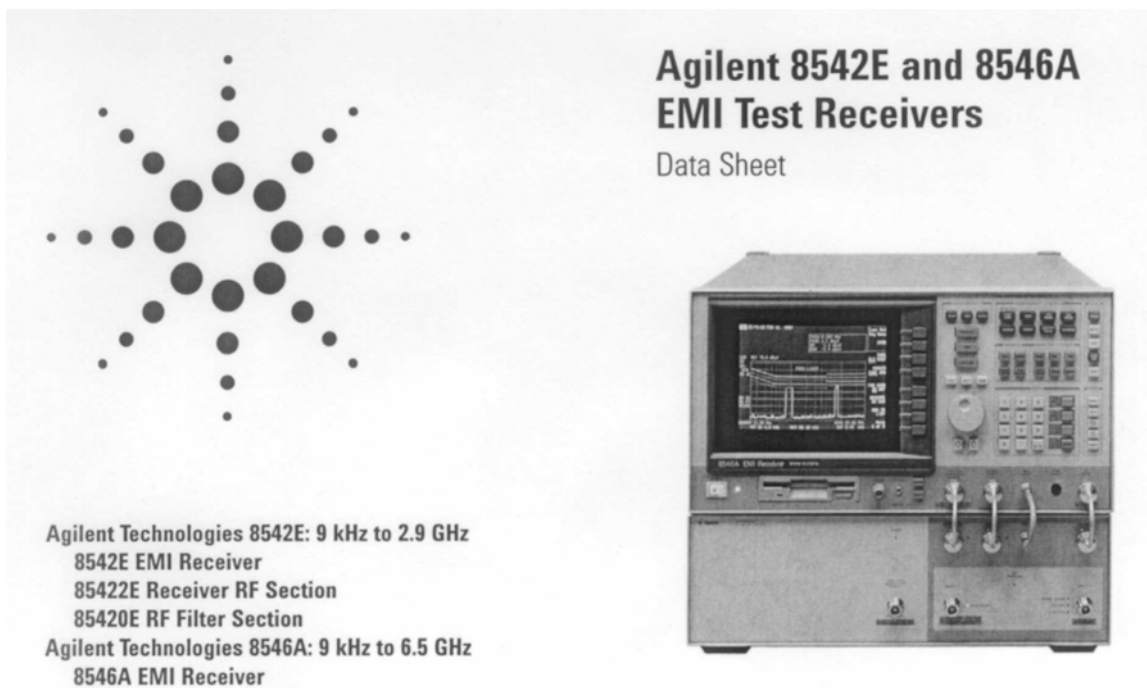
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7.0 TEST EQUIPMENT SETTINGS AND FUNCTIONS (RF Emissions)

7.1 Test Equipment “State of the Instrument for Conducted Emission Measurements”

Conducted Test:

SITE #1 & #2: The Agilent EMI 8546A Receiver Series is a high-performance test receiver especially designed for making commercial EMI (Electro-Magnetic Interference) measurements. It fully conforms to the receiver standards described in CISPR (Comite' International Special Des Perturbations Radioelectriques) Publication 16, C.I.S.P.R. Specification for Radio Interference Measuring Apparatus and Measurement Methods. This type of receiver is used for making measurements according to various governmental standards, such as FCC, EN and VCCI regulations. The HP 8546A tunes from 9kHz. To 6.5 GHz. making it suitable for testing a wide variety of products including but not limited to intentional and unintentional radiators.



HP 8546A Standard Test Configurations

| MENU LABEL Start/Stop Frequency | IF Bandwidth | Averaging Bandwidth | Reference Level |
|------------------------------------|-----------------|------------------------|--------------------|
| 9 kHz-150 kHz | 200 Hz. CISPR | 300 Hz | 70 dBuV |
| 150 kHz – 30 MHz | 9 kHz CISPR | 30 kHz | 75 dBuV |
| 30 MHz – 300 MHz | 120 kHz CISPR | 300 kHz | 80 dBuV |
| 200 MHz – 1 GHz. | 120 kHz CISPR | 300 kHz | 80 dBuV |



7.1 Test Equipment “State of the Instrument for Conducted Emission Measurements” (Continued)

User-defined test parameters based upon the previous table were loaded into the instrument for pre-qualification and qualification testing. The peak, quasi-peak and/or average detector were used according to Section 4.2. For testing performed between 150 kHz and 30 MHz, the EMI Receiver performed a swept frequency measurement with the following EMI Receiver settings:

| Function | Setting |
|-----------------|-----------|
| REF OFFST | 10.0 dB |
| REF | 85.0 dBuV |
| ATTEN | 10 dB |
| IF BW | 9.0 kHz |
| AVG BW | 30 kHz |
| SWP | 2.49 SEC |
| SPAN | 30 MHz |
| ACTIVE DETECTOR | PK |

In reference to the LISN used during testing, the 1uF capacitor in combination with the 50uH inductor is the filter that isolated the mains from the EUT. Consequently, the 50uH inductor isolated the noise generated by the EUT from the mains. The 0.1uV couples the noise generated by the EUT to the EMI Receiver. At frequencies above 150 kHz, the EUT signals are presented with a 50-ohm impedance. The purpose of using the transient limiter is to protect the input of the EMI Receiver from large transients when connected to the LISN. The transient limiter incorporates a limiter, high pass filter, and an attenuator. Lastly, a low loss 50-ohm cable was connected between the transient limiter and LISN.

After the swept frequency scan was performed for both L1 and L2 the six highest readings against the Reference Level were recorded in the data sheet along with a snapshot image of the sweep scan.

Upon completion of the swept frequency scan, the six highest peaks against the reference level were re-measured in manual mode and recorded in the Microsoft Windows Excel “.xls.” spreadsheet.

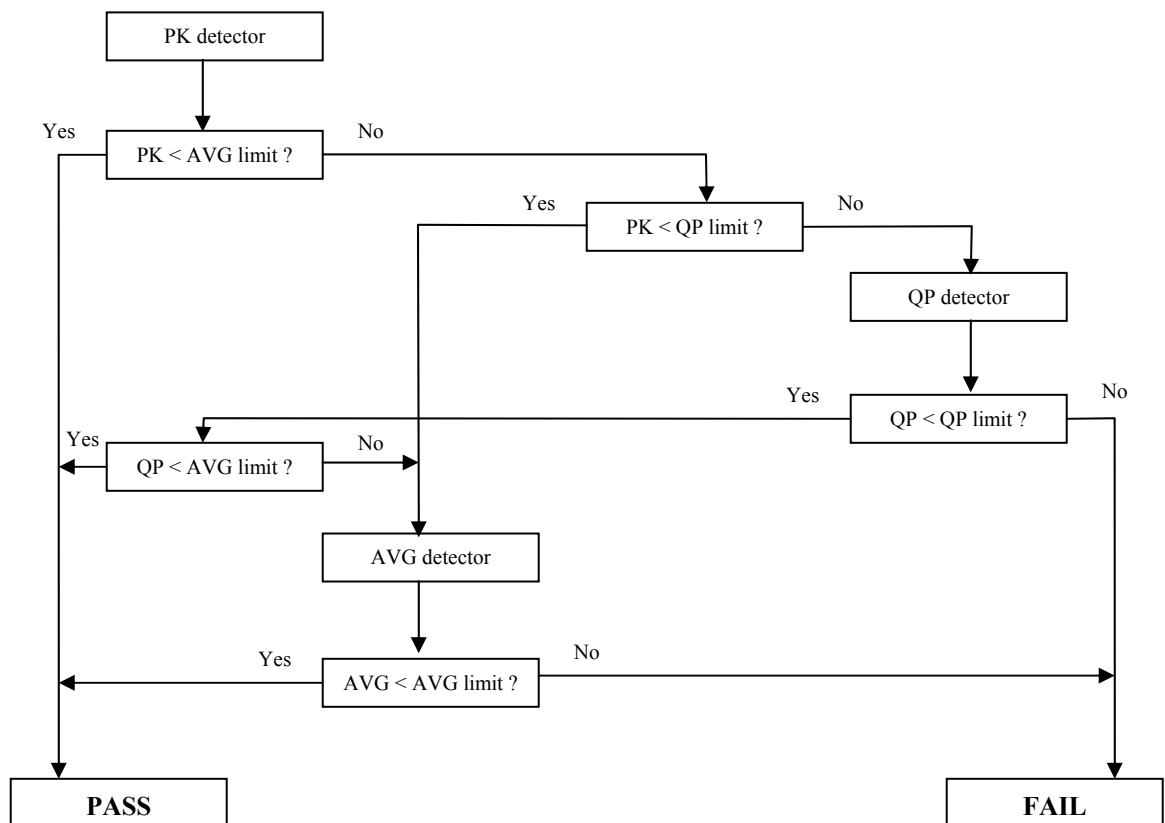
The graphical scans in Appendix A only reflect peak readings while the tabulated data sheets reflect either peak, average, and/or quasi-peak measurements.

Upon completion of the swept frequency scan, the six highest peaks against the reference level were re-measured in manual mode and recorded in the Microsoft Windows Excel “.xls.” spreadsheet.

The graphical scans in Appendix A only reflect peak readings while the tabulated data sheet reflects either peak, average, and/or quasi-peak measurements.



7.2 Decision Tree for Peak Detector Measurements



PK – Peak
QP – Quasi-Peak
AVG – Average



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7.3 Test Equipment “State of the Instrument for Radiated Emission Measurements”

Radiated Test: (30 MHz. – 1000 MHz.)

SITE #1 & SITE #2: The Agilent EMI 8546A Receiver and 8568B/85460A/85685A Series Receiver(s) were independently certified to meet the CISPR-16 requirements by the German BZT (Bundesamt für Zulassungen der Telekommunikation, the German Appeals Office for Telecommunications). Additionally the receiver characteristics were verified/calibrated by an independent third party ISO 17025-calibration laboratory. Because of the added complexity of the open-air ambient environment, which can interfere with the device under test, the receiver in conjunction with a low ambient environment facility and trained personnel were an excellent combination to ensure accurate and repeatable measurements. Specifically, to make an accurate measurement when necessary, the receiver was placed in linear mode and caution was exercised to ensure that the receiver was not in saturation at the front-end mixer because of potential large narrowband or broadband emissions. A useful overload detection scheme was employed to alert the measurement technician of any overload conditions in all frequency ranges and in all modes of receiver operation. The advanced overload detection and measurement scheme were “auto ranged” or automatically put in enough attenuation prior to the first mixer to measure the signal in non-overload conditions. However, the ambient noise floor level of the Aegis Labs Open Area Test Sites (OATS) is substantially lower than most thereby requiring little attention to be paid to the overload condition.

The receiving (Rx) antenna(s) was placed 10m from the nearest side of the EUT facing the Rx antenna. The EUT (if floor-standing) was placed directly on the flush-mounted 360 degree rotating turntable. The EUT (if table-top) was placed directly on an 80cm high non-metallic table, and the table was placed on the rotating turntable. During the initial EMI scan, all the suspect frequencies, i.e.; harmonics, broadband signals were checked with the Rx broadband antennas in both vertical and horizontal polarities. The biconical Rx and log periodic Rx antennas were used from 30 MHz. – 299.99 MHz. and from 300 MHz. – 999.99 MHz.

Upon completion of all harmonic and broadband measurements, the balances of any remaining frequencies were checked between 30 MHz. – 999.99 MHz. Any signals appearing within 20 dB of the classification limit A or B were measured. Each signal was maximized by first rotating the turntable at least 360 degrees and recording the azimuth in the data sheet. Lastly, the Rx antenna was raised and/or lowered to maximize the signal elevation. If the measured signal was obtained using the peak detector and that signal appeared within 3 dB of the regulatory limit line, then the same signal was re-measured using the quasi-peak detector on the EMI receiver. Both meter readings if necessary were recorded on the data sheet. In the case of measuring around ambient signals several methods were employed to ensure accuracy including but not limited to using the “Signal Substitution Method” with the Rx antenna placed at 3m from the EUT, the “Marker Delta Method” or a “Logarithmic Calculation Method” for either broadband or narrowband signals.



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7.4 Conducted Emissions Test Setup

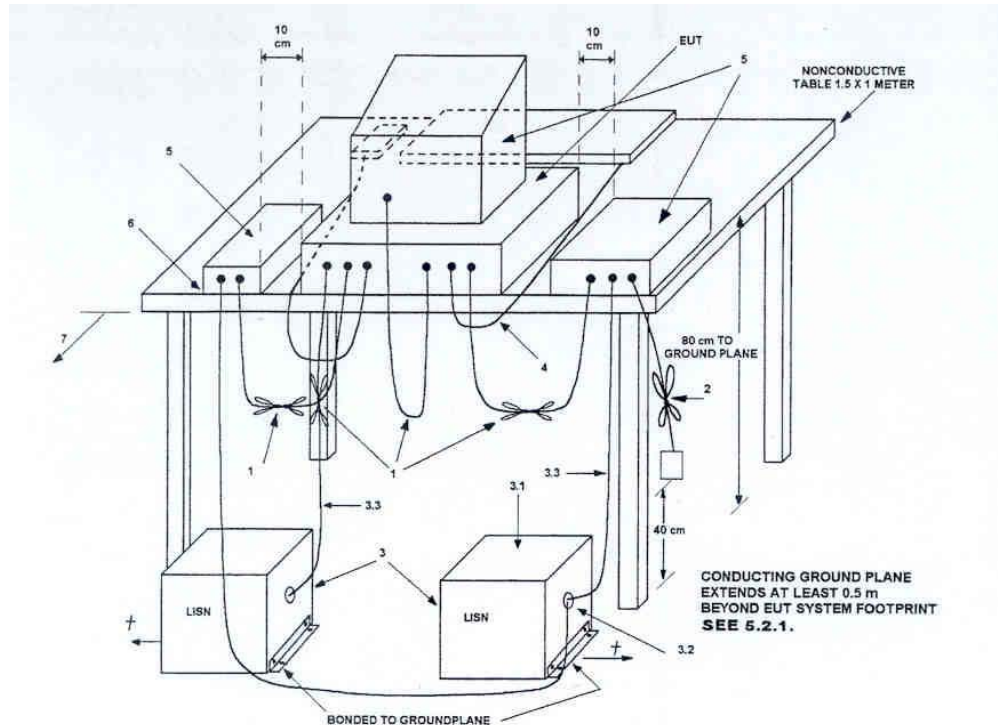
The Equipment Under Test (EUT) shall be configured as a system with peripherals connected, so that at least one interface port of each type is connected to one external peripheral when tested for conducted emissions according to ANSI C63.4-2003. The EUT shall have a minimum of at least one test configuration identified on the Engineering Data Sheets of said report. These are either in a tabletop setup as shown on following page or in a freestanding configuration as required for floor-standing systems. The test data shall be collected using the appropriate EMI Receiver System as described in Section 4.1.

The Conducted Test for tabletop configurations shall be performed on 2 each galvanized sheets measuring 10mm thickness X 8.0 FT.X 10.0 FT. situated in a vertical and horizontal position diagramed in Section 7.5 of this report. The horizontal-conducting plane extends at least 1.5 meters beyond the all four sides of the EUT. For tabletop equipment, a non-metallic table rests on top of the ground plane extending 40 cm from and parallel to the vertical plane.

The EUT shall be powered through an appropriate Line Impedance Stabilization Network (LISN), bonded to the ground plane as described in ANSI C63.4-2003. The LISN power shall be isolated from other filtered power via an additional filter to ensure that RFI from the auxiliary instrumentation or support equipment does not influence the readings obtained. The power input cables to the LISN and the EMI equipment shall be arranged so that they will not influence the measurement results. Any excess power cord shall be folded back and forth to form a 30-cm non-inductive bundle. When applicable the telecom port of the EUT shall be connected to the accessory equipment via a two balanced telecom pairs ISN, which is bonded to the horizontal ground plane as described in CISPR22. The Automated Aegis/LabView Software (ALVS) measurement system was located outside the sphere during the test.



7.5 Conducted Emissions Site Diagram



LEGEND:

- 1) Interconnecting cables that hang closer than 40 cm to the groundplane shall be folded back and forth in the center forming a bundle 30 to 40 cm long (see 6.1.4 and 11.2.4).
- 2) I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m (see 6.1.4).
- 3) EUT connected to one LISN. Unused LISN measuring port connectors shall be terminated in 50 Ω . LISN can be placed on top of, or immediately beneath, reference groundplane (see 5.2.3 and 7.2.1).
 - 3.1) All other equipment powered from additional LISN(s).
 - 3.2) Multiple outlet strip can be used for multiple power cords of non-EUT equipment.
 - 3.3) LISN at least 80 cm from nearest part of EUT chassis.
- 4) Cables of hand-operated devices, such as keyboards, mice, etc., shall be placed as for normal use (See 6.2.1.3 and 11.2.4).
- 5) Non-EUT components of EUT system being tested (see also Figure 13).
- 6) Rear of EUT, including peripherals, shall all be aligned and flush with rear of tabletop (see 6.2.1.1 and 6.2.1.2).
- 7) Rear of tabletop shall be 40 cm removed from a vertical conducting plane that is bonded to the groundplane (see 5.2.2 for options).

Figure 10a—Test arrangement for conducted emissions



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7.6 Radiated Emissions Test Setup

The Open Area Test Sites (OATS) shall be used for radiated emission testing. These test sites are designed according to ANSI C63.4-2003 and ANSI C63.7-1992 guidelines. The OATS facilities are periodically tested using a calibrated field site source with the resultant test data compiled into a statistical data based used to check the integrity of the test site measurements.

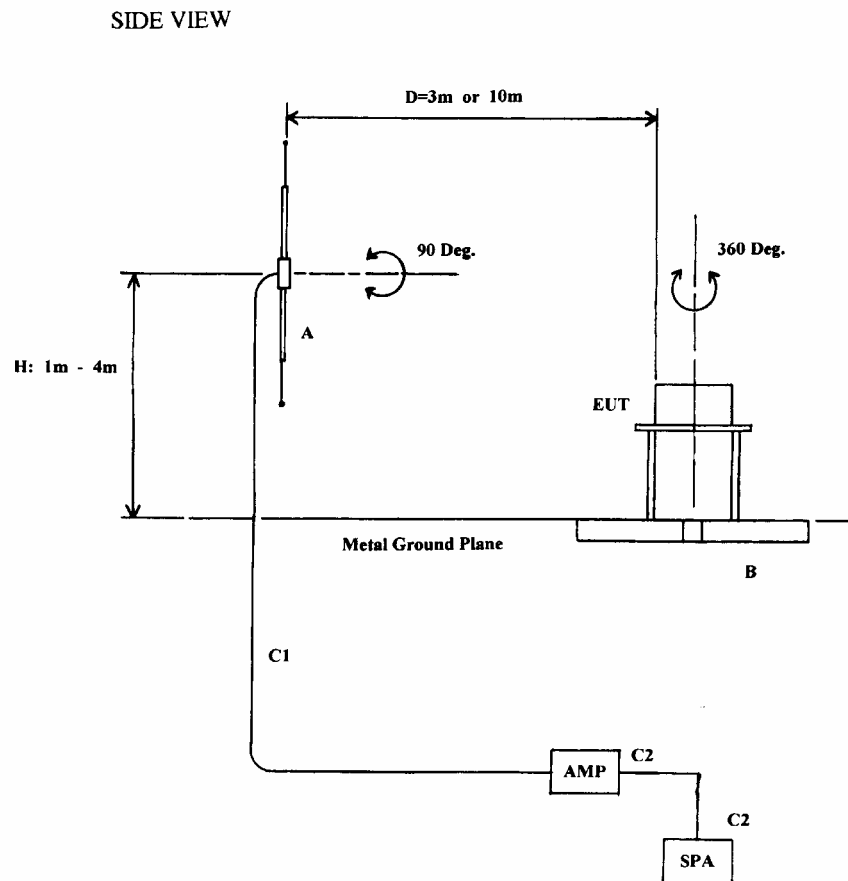
The Measurement procedure shall be in accordance with ANSI C63.4-2003 and ANSI C63.7-1992 requirements. The EUT shall be placed in the prescribed spot of the OATS, (either atop the turntable, or atop the ground plane) where applicable. The following page refers to the setup depicting a typical test configuration; exact EUT set-up is detailed in the Engineering Data Sheets. The turntable shall rotate a minimum of 360 deg. to obtain the highest emissions. During rotation the antenna (s), supported by the mast array shall also be raised and lowered at the test personnel's discretion to identify the maximum energy lobe. See diagram on following page for graphical representation.

For short and permanently connected conductors who cannot be extended by the user with commercially available cables, the EUT shall be tested only with the manufacturer's furnished cables.



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7.7 Radiated Emissions Site Diagram - Side View and Plan View



Legend:

AMP = Amplifier

SPA = Spectrum Analyzer

A = Closest Antenna Element to EUT.

B = Turntable Flush with Ground Plane.

C1 = Heliax High Freq. Low Loss Cable.

C2 = Belden Low Frequency Coax Cable.

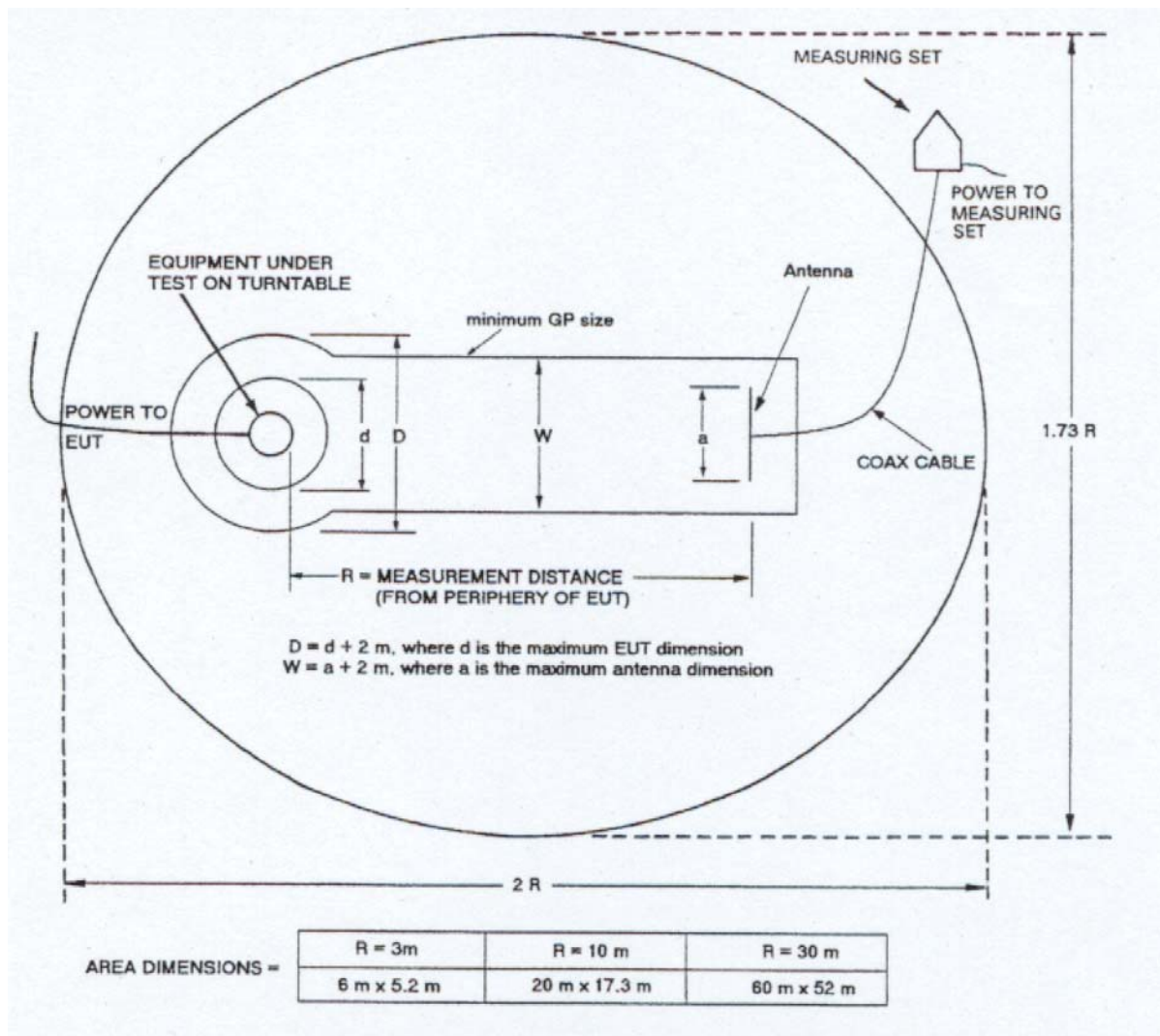
H = Minimum to Maximum Antenna Height

D = Distance Between EUT and Antenna



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7.7 Radiated Emissions Site Diagram – Side View and Plan View (Continued)



Note: Aegis Labs Open Area Test Sites exceed the $2R$ Frensel Ellipse measurement zone as defined under ANSI C63.4: 2003 to minimize possible reflection issues from surrounding structures.



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8.0 MODIFICATIONS AND RECOMMENDATIONS

1. No modifications were made.



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9.0 SAMPLE CALCULATIONS

If a preamplifier is used during the Radiated Emissions Testing, it is required that the amplifier gain be subtracted from the Spectrum Analyzer (Meter) Reading. In addition, a correction factor for the antenna, cable and a distance factor, if any, must be applied to the Meter Reading before a true field strength reading can be obtained. In the Automatic Mode of A.R.M.S. measurements, these considerations are automatically presented as a part of the printout. In the case of manual measurements and for greater efficiency and convenience, usage of the calibration correction factors in the Appendices is necessary to calculate the Corrected Meter Reading. These correlation factors for each meter reading shall be modified to reflect these correlation factors at each frequency value so that the meter readings can be compared directly to the modified specification limit. This modified specification limit is referred to as the "Corrected Meter Reading Limit" (CML).

The equation shall be derived in the following manner:

$$\text{Corrected Meter Reading} = \text{Meter Reading} + F + C - G - D$$

Where, F = Antenna Factor

C = Cable Factor

G = Amplifier Gain

D = Distance Factor

Therefore, the equation for determining the Corrected Meter Reading Limit (CML) is:

$$\text{CML} = \text{Specification Limit} - F - C + G + D$$

For the manual mode of measurement, a table of corrected meter reading limits shall be used to permit immediate comparison of the meter reading to determine if the measured emission amplitude exceeded the specification limit at that specific frequency. There shall be two calculation sheets done, one for three meter and one for ten-meter measurement distances, where applicable. The correction factors for the antenna and the amplifier gain are attached in the Appendices.



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APPENDIX A

TEST DATA

Page 1 of 6 (Appendix A)
Report Number: INTEL-051106F
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CONDUCTED EMISSIONS TEST RESULTS

| | | | |
|-----------------------|--|------------------------|--------------|
| CLIENT: | Hewlett-Packard Company | DATE: | 09/06/05 |
| EUT: | Intel PRO/Wireless 3945ABG Network Connection | PROJECT NUMBER: | INTEL-050901 |
| MODEL NUMBER: | WM3945ABG | TEST ENGINEER: | JC/RJ |
| SERIAL NUMBER: | 00B11A295CVD26965002 | SITE #: | 2 |
| CONFIGURATION: | Tested installed in the host computer's mini PCI slot. | TEMPERATURE: | 34 C |
| | | HUMIDITY: | 14% RH |
| | | TIME: | 1:45 PM |

| | |
|---------------------|--|
| Description: | Conducted RF Emissions (150 kHz – 30 MHz) |
| Results: | PASSED LINE 1 and LINE 2 FCC Class B Limits |

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AEGIS LABS INC.

Conducted Emissions Test Results (Continued)

120VAC (INTEL-050901-03)

| FCC CLASS B CONDUCTED EMISSIONS – LINE 1 | | | | | | |
|--|-------------------------|------------------------|-------------------------|----------------------|----------------------------|-------------------------|
| Freq. (MHz) | Meter Reading (dBuV) | Detector (PK/QP/AV) | Average Limit (dBuV) | Average Delta(dB) | Quasi-Peak Limit (dBuV) | Quasi-Peak Delta(dB) |
| 0.1800 | 38.82 | PK | 55.14 | -16.32 | 65.14 | -26.32 |
| 0.5900 | 36.14 | PK | 46.00 | -9.86 | 56.00 | -19.86 |
| 0.6600 | 36.12 | PK | 46.00 | -9.88 | 56.00 | -19.88 |
| 7.9300 | 39.76 | PK | 50.00 | -10.24 | 60.00 | -20.24 |
| 9.4700 | 39.32 | PK | 50.00 | -10.68 | 60.00 | -20.68 |
| 10.4000 | 39.67 | PK | 50.00 | -10.33 | 60.00 | -20.33 |



13:07:54 SEP 06, 2005

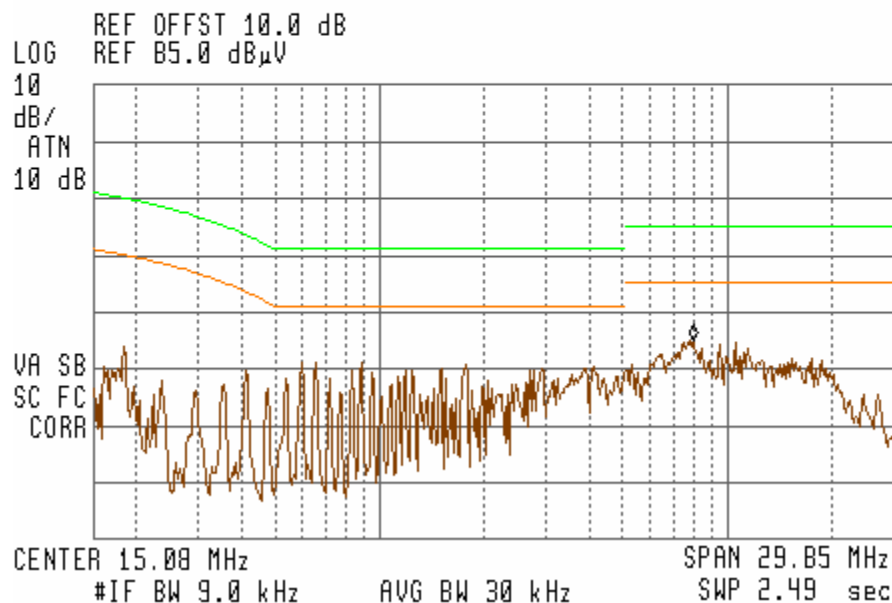
14:52:53 APR 14, 2003 11:58:46 SEP 23, 2004

ACTV DET: PEAK

MEAS DET: PEAK QP AVG

MKR 7.93 MHz

39.76 dBuV





AEGIS LABS INC.

Conducted Emissions Test Results (Continued)

120VAC (INTEL-050901-03)

| FCC CLASS B CONDUCTED EMISSIONS - LINE 2 | | | | | | |
|--|-------------------------|------------------------|-------------------------|----------------------|----------------------------|-------------------------|
| Freq. (MHz) | Meter Reading (dBuV) | Detector (PK/QP/AV) | Average Limit (dBuV) | Average Delta(dB) | Quasi-Peak Limit (dBuV) | Quasi-Peak Delta(dB) |
| 0.1600 | 34.48 | PK | 55.71 | -21.23 | 65.71 | -31.23 |
| 0.1800 | 34.57 | PK | 55.14 | -20.57 | 65.14 | -30.57 |
| 1.7700 | 33.88 | PK | 46.00 | -12.12 | 56.00 | -22.12 |
| 7.9300 | 39.99 | PK | 50.00 | -10.01 | 60.00 | -20.01 |
| 11.4200 | 38.87 | PK | 50.00 | -11.13 | 60.00 | -21.13 |
| 17.3500 | 37.55 | PK | 50.00 | -12.45 | 60.00 | -22.45 |



12:59:31 SEP 06, 2005

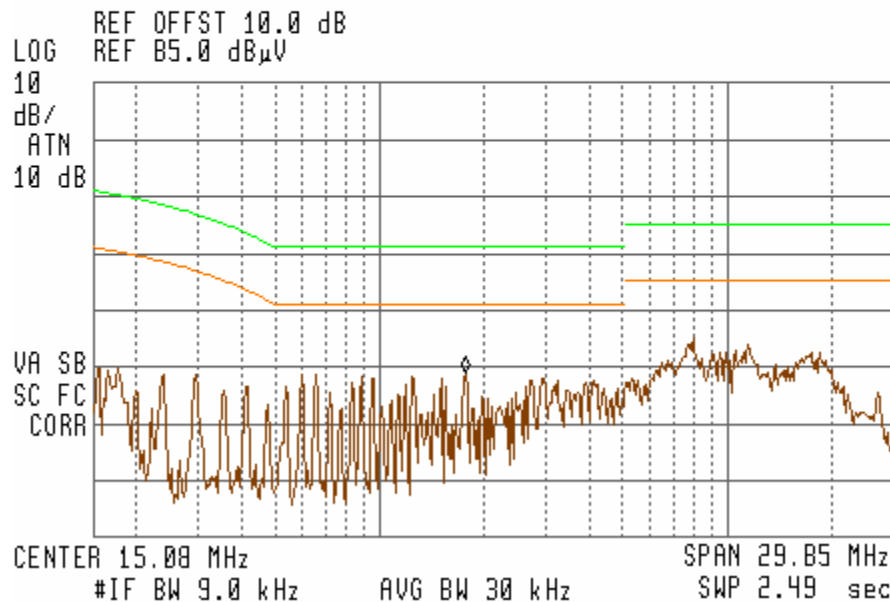
14:52:53 APR 14, 2003 11:58:46 SEP 23, 2004

ACTV DET: PEAK

MEAS DET: PEAK QP AVG

MKR 1.77 MHz

33.88 dBuV





AEGIS LABS INC.

RADIATED EMISSIONS TEST RESULTS

| | | | |
|-----------------------|--|------------------------|--------------|
| CLIENT: | Hewlett-Packard Company | DATE: | 09/06/05 |
| EUT: | Intel PRO/Wireless 3945ABG Network Connection | PROJECT NUMBER: | INTEL-050901 |
| MODEL NUMBER: | WM3945ABG | TEST ENGINEER: | JC |
| SERIAL NUMBER: | 00B11A295CVD26965002 | SITE #: | 2 |
| CONFIGURATION: | Tested installed in the host computer's mini PCI slot. | TEMPERATURE: | 21 C |
| | | HUMIDITY: | 45% RH |
| | | TIME: | 8:30 AM |

| | |
|---------------------|--|
| Description: | Radiated RF Emissions (30 MHz – 1000 MHz) |
| Results: | PASSED Horizontal and Vertical Antenna Polarizations FCC Class B Limits |



AEGIS LABS INC.

Radiated Emissions Test Results (Continued)

120VAC (INTEL-050901-02)

| CLASS B RADIATED EMISSIONS - Horizontal Antenna Polarization | | | | | | | | |
|--|---|--------------------------------------|------------------------------------|---|--|---|----------------------------------|-----------------------------------|
| Measurements Were Taken 10m away from EUT | | | | | | | | |
| <i>Freq.</i> <i>(MHz)</i> | <i>Meter</i> <i>Reading</i> <i>(dBuV)</i> | <i>Antenna</i> <i>Height (cm)</i> | <i>Azimuth</i> <i>(Degrees)</i> | <i>Quasi Pk</i> <i>Or AVG (dBuV)</i> | | <i>Corrected</i> <i>Reading</i> <i>(dBuV/m)</i> | <i>Limits</i> <i>(dBuV/m)</i> | <i>Diff (dB)</i> <i>+=FAIL</i> |
| 64.02 | 10.22 | 400 | 315 | | | 19.22 | 30.00 | -10.78 |
| 136.03 | 6.40 | 400 | 180 | | | 22.68 | 30.00 | -7.32 |
| 166.52 | 8.54 | 400 | 225 | | | 26.34 | 30.00 | -3.66 |
| 199.27 | 6.83 | 400 | 180 | | | 26.01 | 30.00 | -3.99 |
| 240.01 | 9.22 | 400 | 180 | | | 29.32 | 37.00 | -7.68 |
| 336.03 | 9.60 | 350 | 225 | | | 27.88 | 37.00 | -9.12 |
| 375.02 | 9.71 | 300 | 225 | | | 27.86 | 37.00 | -9.14 |

| CLASS B RADIATED EMISSIONS - Vertical Antenna Polarization | | | | | | | | |
|--|-------------------------------------|--------------------------------|------------------------------|-----------------------------------|---|---|----------------------------|-----------------------------|
| Measurements Were Taken 10m away from EUT | | | | | | | | |
| <i>Freq. (MHz)</i> | <i>Meter Reading (dBuV)</i> | <i>Antenna Height (cm)</i> | <i>Azimuth (Degrees)</i> | <i>Quasi Pk Or AVG (dBuV)</i> | | <i>Corrected Reading (dBuV/m)</i> | <i>Limits (dBuV/m)</i> | <i>Diff (dB) +=FAIL</i> |
| 61.26 | 16.51 | 100 | 90 | | | 25.25 | 30.00 | -4.75 |
| 120.04 | 12.70 | 100 | 135 | | | 26.61 | 30.00 | -3.39 |
| 147.63 | 10.12 | 100 | 180 | | | 26.58 | 30.00 | -3.42 |
| 216.01 | 8.31 | 100 | 135 | 6.06 | Q | 25.99 | 30.00 | -4.01 |
| 280.02 | 5.84 | 100 | 180 | | | 28.44 | 37.00 | -8.56 |
| 336.02 | 6.09 | 100 | 315 | | | 24.81 | 37.00 | -12.19 |
| 384.01 | 7.81 | 100 | 270 | | | 27.06 | 37.00 | -9.94 |



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APPENDIX B

PHOTOGRAPHS – TEST SETUPS

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CONDUCTED EMISSIONS – FRONT VIEW

FOR

EUT: Intel PRO/Wireless 3945ABG Network Connection
MODEL NUMBER: WM3945ABG

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Revision Number: N/A



AEGIS LABS INC.



CONDUCTED EMISSIONS – REAR VIEW

FOR

EUT: Intel PRO/Wireless 3945ABG Network Connection
MODEL NUMBER: WM3945ABG

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Report Number: INTEL-051106F
Revision Number: N/A



AEGIS LABS INC.



RADIATED EMISSIONS – FRONT VIEW

FOR

EUT: Intel PRO/Wireless 3945ABG Network Connection
MODEL NUMBER: WM3945ABG

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RADIATED EMISSIONS – REAR VIEW

FOR

EUT: Intel PRO/Wireless 3945ABG Network Connection
MODEL NUMBER: WM3945ABG

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APPENDIX C

CALIBRATION CORRECTION TABLE

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Revision Number: N/A



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Calibration Correction Table

| Freq | Index | | Cable Loss 10m | Horz. Ant 10m | Total | Vert. Ant 10m | Total |
|--------|-------|--|-------------------|------------------|--------|------------------|--------|
| 30.00 | 0.00 | | 0.80 | 18.60 | -19.40 | 17.90 | -18.70 |
| 40.00 | 1.00 | | 1.00 | 15.60 | -16.60 | 14.10 | -15.10 |
| 50.00 | 2.00 | | 1.10 | 11.80 | -12.90 | 10.50 | -11.60 |
| 60.00 | 3.00 | | 1.20 | 8.40 | -9.60 | 7.70 | -8.90 |
| 70.00 | 4.00 | | 1.30 | 6.80 | -8.10 | 6.30 | -7.60 |
| 80.00 | 5.00 | | 1.40 | 6.60 | -8.00 | 6.70 | -8.10 |
| 90.00 | 6.00 | | 1.50 | 8.40 | -9.90 | 8.30 | -9.80 |
| 100.00 | 7.00 | | 1.60 | 10.20 | -11.80 | 9.70 | -11.30 |
| 110.00 | 8.00 | | 1.70 | 11.80 | -13.50 | 10.60 | -12.30 |
| 120.00 | 9.00 | | 1.80 | 13.20 | -15.00 | 12.10 | -13.90 |
| 130.00 | 10.00 | | 1.90 | 14.20 | -16.10 | 13.40 | -15.30 |
| 140.00 | 11.00 | | 1.90 | 14.50 | -16.40 | 14.10 | -16.00 |
| 150.00 | 12.00 | | 1.90 | 15.10 | -17.00 | 14.70 | -16.60 |
| 160.00 | 13.00 | | 2.00 | 15.50 | -17.50 | 14.20 | -16.20 |
| 170.00 | 14.00 | | 2.07 | 15.90 | -17.97 | 16.00 | -18.07 |
| 180.00 | 15.00 | | 2.10 | 16.50 | -18.60 | 16.70 | -18.80 |
| 190.00 | 16.00 | | 2.20 | 16.70 | -18.90 | 18.00 | -20.20 |
| 200.00 | 17.00 | | 2.30 | 16.90 | -19.20 | 17.50 | -19.80 |
| 225.00 | 18.00 | | 2.50 | 17.30 | -19.80 | 17.50 | -20.00 |
| 250.00 | 19.00 | | 2.80 | 17.50 | -20.30 | 18.50 | -21.30 |
| 275.00 | 20.00 | | 2.80 | 19.10 | -21.90 | 19.60 | -22.40 |
| 299.99 | 21.00 | | 2.90 | 19.50 | -22.40 | 20.50 | -23.40 |
| 300.00 | 22.00 | | 2.90 | 13.50 | -16.40 | 14.50 | -17.40 |
| 325.00 | 23.00 | | 3.05 | 15.30 | -18.35 | 16.00 | -19.05 |
| 350.00 | 24.00 | | 3.20 | 15.00 | -18.20 | 15.10 | -18.30 |
| 375.00 | 25.00 | | 3.35 | 14.80 | -18.15 | 16.10 | -19.45 |
| 400.00 | 26.00 | | 3.50 | 14.90 | -18.40 | 15.40 | -18.90 |
| 425.00 | 27.00 | | 3.60 | 15.20 | -18.80 | 15.50 | -19.10 |

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Report Number: INTEL-051106F
Revision Number: N/A



AEGIS LABS INC.

Calibration Correction Table (Continued)

| Freq | Index | Amp | Cable Loss 10m | Horz. Ant 10m | Total | Vert. Ant 10m | Total |
|---------|-------|-----|-------------------|------------------|--------|------------------|--------|
| 450.00 | 28.00 | | 3.70 | 16.10 | -19.80 | 17.70 | -21.40 |
| 475.00 | 29.00 | | 3.85 | 18.10 | -21.95 | 17.40 | -21.25 |
| 500.00 | 30.00 | | 4.00 | 18.30 | -22.30 | 17.60 | -21.60 |
| 525.00 | 31.00 | | 4.05 | 18.30 | -22.35 | 18.40 | -22.45 |
| 550.00 | 32.00 | | 4.10 | 18.80 | -22.90 | 18.90 | -23.00 |
| 575.00 | 33.00 | | 4.20 | 18.50 | -22.70 | 17.90 | -22.10 |
| 600.00 | 34.00 | | 4.30 | 18.20 | -22.50 | 19.80 | -24.10 |
| 625.00 | 35.00 | | 4.35 | 18.30 | -22.65 | 19.60 | -23.95 |
| 650.00 | 36.00 | | 4.40 | 20.40 | -24.80 | 19.50 | -23.90 |
| 675.00 | 37.00 | | 4.40 | 20.80 | -25.20 | 20.60 | -25.00 |
| 700.00 | 38.00 | | 4.40 | 21.30 | -25.70 | 21.10 | -25.50 |
| 725.00 | 39.00 | | 4.55 | 22.30 | -26.85 | 21.50 | -26.05 |
| 750.00 | 40.00 | | 4.70 | 21.20 | -25.90 | 21.90 | -26.60 |
| 775.00 | 41.00 | | 4.80 | 20.80 | -25.60 | 21.70 | -26.50 |
| 800.00 | 42.00 | | 4.90 | 21.90 | -26.80 | 22.10 | -27.00 |
| 825.00 | 43.00 | | 4.90 | 21.20 | -26.10 | 22.50 | -27.40 |
| 850.00 | 44.00 | | 4.90 | 23.00 | -27.90 | 22.00 | -26.90 |
| 875.00 | 45.00 | | 5.05 | 21.70 | -26.75 | 22.30 | -27.35 |
| 900.00 | 46.00 | | 5.20 | 22.70 | -27.90 | 22.90 | -28.10 |
| 925.00 | 47.00 | | 5.25 | 23.60 | -28.85 | 23.20 | -28.45 |
| 950.00 | 48.00 | | 5.30 | 23.20 | -28.50 | 22.90 | -28.20 |
| 975.00 | 49.00 | | 5.35 | 23.60 | -28.95 | 23.50 | -28.85 |
| 1000.00 | 50.00 | | 5.40 | 23.40 | -28.80 | 22.60 | -28.00 |



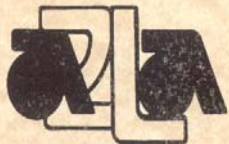
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APPENDIX D

ACCREDITATION CERTIFICATES



AEGIS LABS INC.



**THE AMERICAN
ASSOCIATION
FOR LABORATORY
ACCREDITATION**

ACCREDITED LABORATORY

A2LA has accredited

AEGIS LABS, INC.
Trabuco Canyon, CA

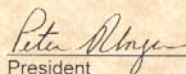
for technical competence in the field of

Electrical Testing

The accreditation covers the specific tests and types of tests listed on the agreed scope of accreditation. This laboratory meets the requirements of ISO/IEC 17025 - 1999 "General Requirements for the Competence of Testing and Calibration Laboratories" and any additional program requirements in the identified field of testing.

Presented this 28th day of May 2004.




President

For the Accreditation Council
Certificate Number 1111-01
Valid to February 28, 2006

For tests or types of tests to which this accreditation applies,
please refer to the laboratory's Electrical Scope of Accreditation.



AEGIS LABS INC.



American Association for Laboratory Accreditation

SCOPE OF ACCREDITATION TO ISO/IEC 17025-1999

AEGIS LABS, INC.¹
32231 Trabuco Creek Road
Trabuco Canyon, CA 92678
Steve Kuiper Phone: 949-459-7886

ELECTRICAL (EMC)

Valid To: February 28, 2006

Certificate Number: 1111-01

In recognition of the successful completion of the A2LA evaluation process, accreditation is granted to this laboratory to perform the following electromagnetic compatibility tests:

| Technology | Test Method(s) |
|--|--|
| Conducted Emissions Measurements 150 kHz. – 30 MHz. Radiated Emissions Measurements 30 MHz. - 40 GHz. | CFR 47, FCC Part 15 (ANSI C63.4: 1992), EN55022: 1994 / A1: 1995 / A2: 1997 EN55011:1998; IEC CISPR11: 2003, CISPR 13, CISPR 22:1997; AS/NZS 3548 CISPR 22:2002, SS IEC CISPR22, VCCI V-3/2003.04, CNS13438 1997, ICES- 003, RSS-210, SS IEC CISPR22, ANSI/TIA/EIA 603A- 2001, AS/NSZ 4771:2000, EN61000-6-3:2001, EN61000-6-4:2001, SI 961-6-1:2002 |
| Product Family Generic Standards | EN50081-1: 1992, EN50081-2: 1993, EN50082-1: 1997, EN50130-4: 1995/A1, EN55020:1994/A11/A12/A13/A14 EN55024: 1994/A1: 2001, EN55103-1: 1996, EN55103- 2:1996, EN61000-6-1: 2001, EN61000-6-2: 1999/2001 EN61000-4-3: 2001, EN61000-6-4: 2001, EN300 328- 1: v1.2.2, 1.3.1, EN300-328-2: v1.1.1, 1.2.1, EN301 489-17, IEC60601-1-2 (up to 1 GHz), EN61326:1997 A1/A2, EN50091-2:1995, EN50130-4:1995 A1,EN300 386:2003 |
| Radiated Emissions Measurements (H-Field 30Hz-30 MHz) | CFR 47, FCC Part 18 (ANSI C63.4: 1992) |
| Electrostatic Discharge Immunity ² | IEC61000-4-2 1995 A1: 1998 / A2: 2000 |
| Radiated Immunity ² (Radiated E-field 10kHz to 1.0 GHz) | IEC61000-4-3: A1:1998, A2, 2000, 2002 |
| Electrical Fast Transient/Burst Immunity ² | IEC61000-4-4: 1995 A1: 2000 & A2: 2001 |

(A2LA Cert. No. 1111-01) 05/28/04
5301 Buckeystown Pike, Suite 350 • Frederick, MD 21704-8373 • Phone: 301-644 3248 • Fax: 301-662 2974

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| | |
|--|---|
| Surge Immunity & Voltage Spikes ² | IEC61000-4-5: 1995 A1: 2000, 2001, ITU-T K.20 |
| Conducted Immunity ² | IEC61000-4-6: 1996 A1: 2000, 2001, 2003 |
| Power Frequency Magnetic Field Immunity ² | IEC61000-4-8: 1993 A1: 2000, 2001 |
| Voltage Dips, Short Interruptions ² | IEC61000-4-11: 1994 A1: 2000 |
| Harmonic Current Emissions ² | EN61000-3-2: 2000 |
| Voltage Fluctuations and Flicker ² | EN61000-3-3: 1995, A1:2001 |

Peter Nguyen

¹ This accreditation covers testing performed at the main laboratory listed above, and the satellite laboratory located at 23091 Antonio Parkway, Suite 310, Rancho Santa Margarita, CA 92688.

² Immunity (Susceptibility) testing is performed at the satellite laboratory located at 23091 Antonio Parkway, Suite 310, Rancho Santa Margarita, CA 92688.